

# UNITED STATES PATENT OFFICE.

RAYMOND EDWIN CROWTHER, OF CARLISLE, ENGLAND.

PHOTOGRAPHIC SENSITIVE PLATES AND THE LIKE.

1,109,514.

Specification of Letters Patent.

Patented Sept. 1, 1914.

No Drawing.

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*To all whom it may concern:*

Be it known that I, RAYMOND EDWIN CROWTHER, a subject of the King of Great Britain and Ireland, and resident of Carlisle, Cumberland county, England, have invented certain new and useful Improvements in Photographic Sensitive Plates and the like, of which the following is a specification.

This invention relates to the sensitive coatings of photographic plates, flexible films and papers, and consists in improvements therein the object of which is to prevent the phenomenon known as reversal of the image which ordinarily takes place on prolonged exposure of the sensitive surface to light, so that with the improved plates or films an image may be obtained in correct or practically correct gradation either by exposure and subsequent development or by exposure only.

I am aware that hydrazin, hydroxylamin and their derivatives have been employed for the same purpose and that it has been stated that the well-known active halogen absorbents which are used for the development of the invisible image (generally amido-benzene or hydroxybenzene derivatives) are quite unable, if the active groups occupy the ortho or para positions in the benzene ring, to absorb the free halogen resulting from the action of light on a silver haloid film, and can not prevent reversal. After considerable research I have found, however, that if a sensitive surface, in which the sensitive agent is a haloid salt of silver; be bathed or otherwise suitably treated with a solution of any one of the para-di-amido derivatives of benzol and toluol including the methyl and ethyl substitution compounds and the salts of such derivatives, gross over exposure up to the stage of printing out may be given without reversal taking place and that on suitable subsequent development an image can be produced in which the quantity of silver is practically proportional to the light action. Moreover, the said para compounds or derivatives and the products resulting therefrom by the action of light need not be removed from the film by washing or other means prior to development.

As an example of the method of carrying my invention into effect by bathing, I immerse any ordinary sensitive photographic plate, film or paper in a solution made by dissolving one part by weight of paratoluy-

enediaminehydrochlorid (which is the hydrochloric acid salt of a mono-methyl derivative of para-diamido-benzene, (commonly known as paraphenylenediamin), which is an active halogen absorbent capable of being used for the development of the invisible image and in which the active groups occupy the para position of the benzene ring, preferably freshly prepared, and one part by weight of sodium sulfite crystals in 75 parts by weight of distilled water, adding to the solution so obtained one third of its volume of ethyl alcohol. These additions of sodium sulfite crystals and ethyl alcohol are not essential, but preferable, as they have a preservative action. The plate or film is left in this solution for a period of time sufficient to insure uniform penetration of the coating, the time of immersion varying, according to the nature and age of the emulsion being treated, from, say, thirty seconds to two minutes. The plate, film or paper is then lifted from the bath and after removal of the excess of liquid from the sensitive surface, put to dry; the whole of the above operation being conducted in light to which the emulsion is not sensitive, or in absolute darkness. When dry the plate, film or paper is ready for exposure. The aforesaid solution may alternatively be applied to the sensitive surface by means of a suitable brush or pad, spraying or other appropriate means. If however it is desired to prepare an emulsion possessing non-reversing properties to be subsequently coated on glass or other suitable support, the aforesaid solution, for example, may be added to the emulsion immediately previous to coating, in the proportion of 120 cubic centimeters to every 20 grams of silver contained in the emulsion.

It is to be distinctly understood that I do not confine myself to the use of the particular salt or solvents mentioned in the above examples or to the quantities specified.

In order to take full advantage of the property of non-reversibility imparted to the emulsion by the addition of the aforesaid solution and to produce at the same time images in correct or practically correct gradation when exposures grossly exceeding the minimum necessary to produce an image developable in the ordinary way have been given, it is essential to apply a developer which acts slowly.

What I claim as my invention and desire to protect by Letters Patent of the United States is:—

1. Photographic plates, films and papers  
5 the coatings of which are rendered sensitive by a haloid salt of silver and for the purpose of preventing the reversal of the image impregnated with a solution of any para-diamido derivative of benzol and to-  
10 luol, including the methyl and ethyl substitution compounds and the salts of such derivatives.

2. Photographic plates, films or papers having coatings rendered sensitive by a ha-

loid salt of silver and impregnated with a 15  
solution of any one of the para-diamido derivatives of benzol and toluol, including the methyl and ethyl substitution compounds and the salts of such derivative, with addition of a solution of sodium sulfite. 20

In testimony whereof I have hereunto signed my name in the presence of two witnesses.

RAYMOND EDWIN CROWTHER.

Witnesses:

THOMAS E. THORP,  
CARL BOLLÉ.